USE INFORMATION AND AIR MONITORING RECOMMENDATIONS FOR THE PESTICIDE ACTIVE INGREDIENT DICOFOL

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USE INFORMATION AND AIR MONITORING RECOMMENDATIONS FOR THE PESTICIDE ACTIVE INGREDIENT DICOFOL

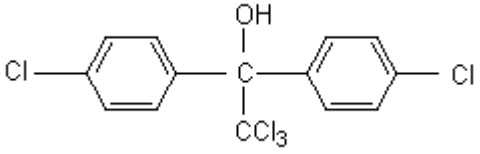
A. BACKGROUND

This recommendation contains general information regarding the physical-chemical properties of dicofol and the reported historical uses as pesticides in California. The Department of Pesticide Regulation (DPR) provides this information to assist the Air Resources Board (ARB) in their selection of appropriate locations for conducting pesticide air monitoring operations.

Physical-Chemical Properties

Dicofol is an organochlorine miticide. Its structure is similar to dichloro-diphenyl-trichloroethane (DDT) and differs from DDT with replacement of the hydrogen (H) on C-1 by a hydroxyl (OH) functional group (Figure 1). Dicolfol has two isomers, 1,1-bis(4-chlorophenyl)-2,2,2-trichloroethanol and 1-(2-chlorophenyl)-1-(4-chlorophenyl)-2,2,2-trichloroethanol. Usually dicofol is synthesized from technical DDT. During this synthesis, DDT is first chlorinated to an intermediate, Cl-DDT, followed by hydrolyzing to dicofol. After the synthesis reaction, DDT and Cl-DDT may remain in the dicofol product as impurities.

Figure 1. The Chemical Structure of Dicofol



Pure dicofol is a white crystalline solid. Technical dicofol composed of 80-85% p,p'-dicofol and 15-20% o,p'-dicofol is a reddish-brown, extremely viscous nonfree-flowing liquid with an odor like fresh cut hay. It is stable under normal conditions, but temperature above 100 ^{o}C (212 ^{o}F) may result in thermal decomposition. Thermal decomposition products may include toxic and corrosive fumes of chlorides and other toxicants. While dicofol may burn, it does not ignite readily with auto-ignition temperature greater than 200 ^{o}C (392 ^{o}F). Containers may explode in the heat of fire. Fire produces toxic products of hydrogen chloride and chlorine gas. Dicofol is slowly corrosive to iron or mild steel (EXTOXNET 1996). Dicofol is soluble in organic solvents (dichloromethane, methanol, n-heptane, and xylene) and relatively insoluble in water. Table 1 lists some of physicochemical properties of dicofol.

Table 1. Physicochemical Properties of Dicofol (DPR, 2008 except for those denoted)

Chemical name	1,1-bis(chlorophenyl)-2,2,2-trichloroethanol 1-(2-chlorophenyl)-1-(4-chlorophenyl)-2,2,2-trichloroethanol (US EPA, 1998)
Common name	Dicofol
Tradenames[†]	Acarin, Cekudifol, Decofol, Dicaron, Dicomite, Difol, Hilfol, Kelthane, and Mitigan.
CAS number	115-32-2
Molecular formula	$C_{14}H_9Cl_5O$
Molecular weight	370.51
Appearance	Pure dicofol is a white crystalline solid. Technical dicofol is a red-brown or amber viscous liquid.
Odor	Similar to fresh-cut hay
Vapor pressure (25 °C) (40 °C)	3.9×10^{-7} mm Hg 2.3×10^{-6} mm Hg
Specific gravity (20 °C)	1.13
Density (25 °C)	1.45 for technical grade (WHO/FAO, 1996)
Melt point	78.5-79.5 °C for pure dicofol (WHO/FAO, 1996) 50 °C for technical dicofol (EXTOXNET, 1996)
Solubility (25 °C)	0.83 ppm Soluble in most organic solvents
Partition coefficient	4.28 (EXTOXNET, 1996)
Octanol-water coefficient (Kow)	190
Soil adsorption coefficient (Kd)	8.38 – 82.8 depending on soil type, pH, and organic carbon content 5000 (estimated) (EXTOXNET, 1996)
Hydrolysis half-lives (25 °C)	>107 days at pH 5, 2-3 days at pH 7, 0.02 days at pH 9
Photolysis half-lives (25 °C, pH 5)	4 days for sensitized exposed 257 days for sensitized dark 93 days for non-sensitized exposed 223 days for non-sensitized dark
Soil metabolism half- lives	15.9 – 339 days depending on soil conditions

[†]Disclaimer: The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as either an actual or implied endorsement of such products.

Dicofol is a contact miticide used to control numerous species of crop-feeding mite pests such as the red spider mite. It is used on varieties of fruit, vegetable, ornamental and field crops. Dicofol is also used in combination with other pesticides such as the organophosphates methyl parathion and dimethoate.

Dicofol application methods include ground application, such as dip treatment, high volume ground spray, and low volume ground spray; aerial application, such as dust spray, high volume spray (dilute), low volume spray (concentrate), general surface spray; and other methods, such as spot treatment, nursery stock, preharvest and postharvest treatments. Application equipment includes dip tank, groundboom, duster, low volume sprayer, power sprayer, sprayer, tank-type sprayer, air bluster, fixed wing aircraft, and helicopter.

Dicofol is moderately persistent in soil with half-lives ranging 15.9 – 339 days depending on soil type, pH, redox potential, organic carbon content, moisture content, and microbial population. It is almost insoluble in water and adsorbs very strongly to soil particles. It is therefore nearly immobile in soils and unlikely to infiltrate to groundwater. When dicofol is released into open waters by chance, it is expected to adsorb to sediment. Dicofol is susceptible to chemical breakdown in moist soils and subject to degradation by UV light. It also degrades in water when exposed to UV light at pH levels above 7. In a number of studies, dicofol residues on treated plant tissues remained unchanged for up to 2 years (US EPA, 1998).

Dicofol is known to be harmful to aquatic animals, and causes egg shell thinning in various species of birds. It is moderately toxic to mammals, and accumulates in body fat to a plateau level related to absorption. It is also cumulative in the environment due to its persistency (WHO, 1996). The US EPA has determined that dicofol may present serious concerns in occupational and residential settings. The toxicity endpoint of concern in these settings is hormonal toxicity. The US EPA has also determined that dicofol may present an ecological risk (US EPA, 1998). US EPA has classified dicofol as toxicity class II - moderately toxic, and toxicity class III - slightly toxic, depending on the formulation. Products containing dicofol bear the Signal Word DANGER or CAUTION, depending on the formulation.

B. DICIFOL PESTICIDE USE IN CALIFORNIA

Dicofol was introduced commercially in 1955. US EPA temporarily canceled dicofol use in 1986 because of DDT and related contaminants. It was reinstated when modern manufacturing was able to produce technical grade dicofol with less than 0.1% DDT impurity. Currently, there are five products containing dicofol as an active ingredient (a.i.) registered in California, one Dicofol 3 Dust, two emulsifiable liquid formulations of Kelthane MF and Dicofol 4E, and two water soluble powder formulations of Kelthane 50 WSP and Dicofol 50WSB. Their active ingredient contents, registered agricultural uses, and maximum application rates are summarized in Table 2. Dicofol is classified Group C chemical, a possible human carcinogen, and on the list of priority 200 active ingredients for Birth Defect Prevention Act. SB-950 evaluation concluded possible adverse effects identified in oncogenicity and reproduction studies (DPR, 2008).

With DPR's implementation of full pesticide use reporting in 1990, all users must report the agricultural use of any pesticide to their county agricultural commissioner, who subsequently forwards this information to DPR. DPR compiles and publishes the use information in the annual Pesticide Use Report (PUR). The data in 1996 was the most recent annual use that has been completely compiled.

The statewide annual use of active ingredient dicofol ranged approximately between 183,000 and 217,000 pounds from 2001 to 2005, but dropped to 102,000 pounds in 2006. The majority of dicofol use occurred in four counties: Fresno, Tulare, Kings, and Merced (Table 3).

The annual use of the top four counties accounted for 67% to 79% of the statewide annual use (Table 3). Monthly use in the top four counties in the years from 2001 to 2006 showed the high use period occurred from May to August with the peak use in June and July (Figure 2). Table 4 lists the monthly dicofol use in each year for the top four counties. The monthly use pattern showed a trend that the peak uses tend to be earlier from north to south in recent two years (2005 and 2006). In general, dicofol use in 2006 decreased to almost half of each previous annual use in three of the four top use counties, but increased in Merced County (Table 4).

In California 66% of dicofol use was on cotton during 2001-2006, followed by beans (12%), orange (6%), walnut (4%), and wine grapes (2%). Other 54 crops accounted for only 10% (Table 5).

Table 2. Summary of active ingredient content, registered agricultural uses and maximum application rate for dicofol products currently registered in California

Product	A. I. content (%)	Use on crops	Maximum application rate (pounds of a.i./acre)
Kelthane 50WSP and Dicofol 50WSB	50	Cucurbits	0.625
		Grapes	0.25
		Pomefruits	3 for trees >10 ft tall
		Strawberries	2 for cyclamen mites only
Dicofol 50WSB	50	Stone fruits	1.5
Kelthane MF and Dicofol 4E	42	Beans	1.5
		Cotton	1.5
		Hops	1.167
		Mint	1.25
		Peppers, Tomatoes	0.75
Kelthane MF	42	Citrus	3 for trees >10 ft tall
		Pecans, Walnuts	2
Dicofol 4E	42	Cucurbits	0.625
Dicofol 3 Dust	3	Cucurbits	0.63
		Grapes	1.2

Table 3. Annual Dicofol Use by County during the Years of 2001-2006
(Pounds of Active Ingredient)

County/Year	2001	2002	2003	2004	2005	2006	Total
FRESNO	75265	51976	49215	68440	61051	27799	333744
TULARE	40341	35513	42239	43507	35060	10155	206815
KINGS	18674	25114	27709	31010	29124	7839	139470
MERCED	19746	17070	18552	27707	19666	22032	124773
STANISLAUS	14536	13948	11925	13822	7120	5330	66681
KERN	9345	10338	8726	5966	12774	5828	52977
SAN JOAQUIN	3379	4895	3527	5582	4839	5924	28146
MADERA	4369	3019	2037	2454	5358	4938	22173
BUTTE	4846	1278	4196	2255	3797	1102	17474
SUTTER	3071	4067	2500	1846	1580	2905	15969
MONTEREY	4504	1523	802	1824	3767	1825	14246
IMPERIAL	3103	2271	2371	2965	2138	472	13321
RIVERSIDE	1913	2080	3140	2694	484	1212	11524
YOLO	1511	2466	1771	403	431	341	6924
GLENN	1066	1273	980	618	1226	1170	6333
TEHAMA	1128	2356	2159	42	277	29	5991
SOLANO	1210	1294	958	368	663	184	4677
COLUSA	233	770	403	1775	756	479	4415
SANTA BARBARA	797	349	162	636	1311	571	3826
SANTA CLARA	7	26	179	395	840	543	1991
CONTRA COSTA	1282	33	301	334		10	1960
SAN DIEGO	385	290	496	288	235	86	1780
VENTURA	189	23	441	695	251	27	1625
SISKIYOU			8	494	874	149	1525
OTHER 21 COUNTIES	1908	1044	1312	718	170	551	5703
Statewide use	212809	183014	186112	216836	193791	101501	1094061
Top four counties use	154027	129672	137715	170663	144900	67825	804802
Percent of top four counties to statewide use	72%	71%	74%	79%	75%	67%	74%

Figure 2. Monthly Dicofol Use in Top Four Counties during the Years of 2001-2006

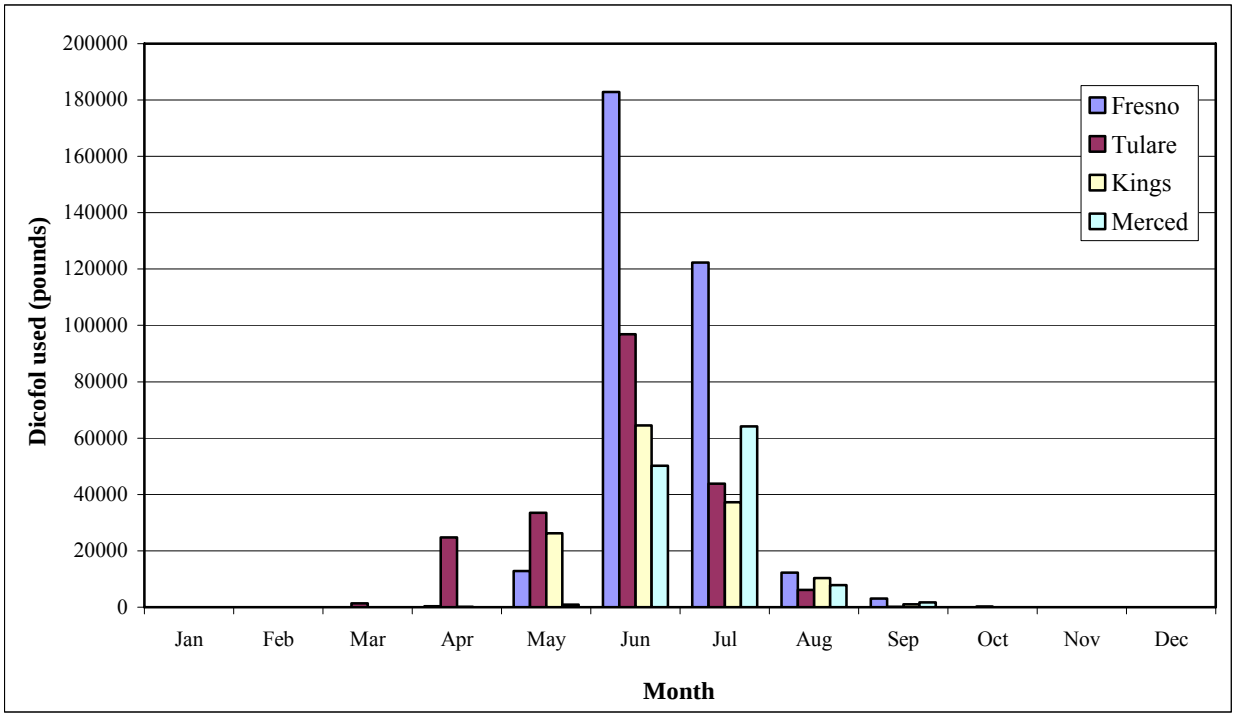


Table 4. Monthly Dicofol Use by Top Four Counties in Each Year of 2001-2006
(Pounds Active Ingredient)

County Year	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	Total	2006 vs previous year (%)
Fresno Total	**25**	**329**	**12780**	**182896**	**122323**	**12209**	**3102**	**12**	**333744**	
2001			1481	46171	24900		94		72645	38
2002	2	54	2141	36384	10432	643	2319		51976	53
2003			224	13653	30713	4264	348	12	49215	56
2004		230	8639	51899	6827	642	203		68440	41
2005	23		284	22118	35807	2613	138		61051	46
2006			11	12670	13645	1473			27799	
Tulare Total	**1363**	**24774**	**33513**	**96857**	**43790**	**6188**	**145**	**186**	**206815**	
2001	249	5531	5938	20759	7584	152		128	40341	25
2002	128	1847	11525	15227	5599	987	143	57	35513	29
2003	50	5757	4062	14506	14286	3579			42239	24
2004	616	5775	6809	26670	3636			0	43507	23
2005	319	5298	4039	14226	9844	1334			35060	29
2006		565	1141	5468	2842	136	2	0	10155	
Kings Total	**2**	**100**	**26278**	**64507**	**37235**	**10325**	**1021**		**139470**	
2001			3292	11049	3467	5	861		18674	42
2002	1	100	9482	8937	2396	4037	160		25114	31
2003			1740	12195	9218	4555			27709	28
2004			11506	13488	5896	120			31010	25
2005	1		183	16009	11323	1608			29124	27
2006			75	2829	4935				7839	
Merced Total			**944**	**50172**	**64157**	**7821**	**1679**		**124773**	
2001			174	11144	6813	1575	40		19746	112
2002			19	5383	10607	1060			17070	129
2003			32	3352	14053	960	156		18552	119
2004			609	19228	6302	1470	99		27707	80
2005			111	5207	12462	1229	657		19666	112
2006				5858	13920	1527	727		22032	
Top four Counties	**1390**	**25157**	**73516**	**394432**	**267505**	**33969**	**5947**	**198**	**802182**	

Table 5. Dicofol Use by Commodity during the Years of 2001-2006
(Pounds Active Ingredient)

Year	2001	2002	2003	2004	2005	2006	2001-2006	% Total
BEANS, DRIED-TYPE	12436	16325	13766	15969	10492	10303	79290	**7**
BEANS, SUCCULENT (OTHER THAN LIMA)	9184	10089	7723	10767	7655	5464	50882	**5**
GRAPES, WINE	5917	3942	1729	2341	4642	1915	20486	**2**

C. AIR MONITORING RECOMMENDATIONS

DPR requests that ARB conducts one field application monitoring and one ambient monitoring for dicofol in 2008. The technical grade dicofol used in formulated products is a mixture of two isomers—approximately 80% p,p'-dicofol and approximately 20% o,p'-dicofol. The sampling and analysis should account for both isomers, either separately or combined. In addition, ARB should investigate the possible breakdown products, 2,2-dichloro-1,1-bis(4-chlorophenyl) ethanol (p,p'-FW-152) and 4,4'-dichlorobenzophenone (p,p'-DCBP). Based on a preliminary assessment of the toxicology data, DPR requests the target quantitation limit of 0.2 $\mu g/m^3$ for dicofol and breakdown products (Warmerdam, 2007). DPR recommends close coordination with the county agricultural commissioner or the registrant, and local agencies and organizations to select the most appropriate sampling sites and periods for both application and ambient air monitoring. If a sampling site is located on a private property, permission from the property owner must be obtained before the monitoring starts.

Application monitoring study

The highest dicofol application label rate is 2-3 pounds of active ingredient per acre on pomefruits (apple, crabapple, pears, and quince) and citrus for trees taller than 10 feet (Table 2). Considering two thirds of dicofol was used on cotton in California, DPR recommends ARB choose an aerial application on a cotton field at an application rate of 1.5 pounds per acre. Dicofol annual use on cotton was similar from 2001 to 2005 and decreased in 2006 to half of the previous annual use (Table 5). This recent inconsistency makes monitoring recommendation more complicated. Further use data analysis showed that the total dicofol use decreased on cotton in three of the top four counties but increased in Merced County (Table 6). The change of total pounds used was correlated to that of the acreage treated ($r=0.997$) on cotton in the top four counties (Table 6). Figure 3 depicts the cumulative frequency distribution of treated acres and application rates for individual aerial applications on cotton in the top four counties during 2005 and 2006. The frequency distribution of pounds active ingredient used is expected to be similar to the treated acreage since they are highly correlated. Although the total pounds used, acres applied, and aerial application frequencies in 2006 decreased to great extents compared to those in 2005, the use frequency distribution patterns were very similar except for the application rate at lower end slightly towards higher in 2006 than 2005 (Figure 3). To assist ARB in monitoring site selection, Table 7 lists basic information (time and location) of all reported aerial applications on cotton with application rate equal to or higher than 1.0 pound of active ingredient per acre in the top four counties during 2005 and 2006. Preferably the monitoring field should be larger than 64 acres which is the average field size among the data in Table 7. In case a smaller field has to be compromised, it should be at least 10 acres. If a lower application rate has to be compromised, it should be at least 1.0 pound/acre.

The sampling locations must have enough clearance for sampler placement and airflow. Ideally, samplers should be placed a minimum of 20 meters from the application area. At least eight samplers should be located around the field, four on each side and four at each corner. An extra sampler should be collocated at downwind sampling location. The collocated sample will be collected at this site during each sampling interval. In addition, DPR requests that two additional

samplers be set up adjacent to two of the primary samplers, preferably on opposite sides, and equipped with a sample tube and particulate filter to monitor for particulates. The two particulate samples will be collected during each sampling interval. Prior to application, at least two background samples should be collected for 18-24 hours duration.

Air samples should be taken before, during, and after application and for three Daytime/Overnight sampling periods as in the following schedule.

Sample period begins	**Sample duration time**
Background (pre-application)	Minimum 18 – 24 hours
Application	Start of application until 1 hour after end of application
1 hour after ending of application (post-application)	1 hour after end of application until 1 hour before sunset
1 hour before sunset	Overnight* until 1 hour after sunrise
1 hour after sunrise	Daytime until 1 hour before sunset
1 hour before sunset	Overnight until 1 hour after sunrise
1 hour after sunrise	Daytime until 1 hour before sunset
1 hour before sunset	Overnight until 1 hour after sunrise

*All overnight samples must include the period from one hour before sunset to one hour after sunrise.

For quality assurance field spikes, trip spikes, and trip blanks should be prepared in the laboratory and handled as the same as the field samples.

DPR requests the following information to be included in the monitoring report:

1) an accurate record of the application site, including topographic features
2) an accurate record of the positions of the monitoring equipment with respect to the application site, including the exact direction and distance of the samplers from the edge of the application site
3) an accurate record of pesticide application, including quantity of pesticide applied, application starting and ending time, method, and application rate, etc.
4) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles with respect to North (identified as either true or magnetic North)
5) if applicable, meteorological data collected at 1-minute intervals including wind speed and direction, humidity, air temperature, and comments regarding degree of cloud cover.

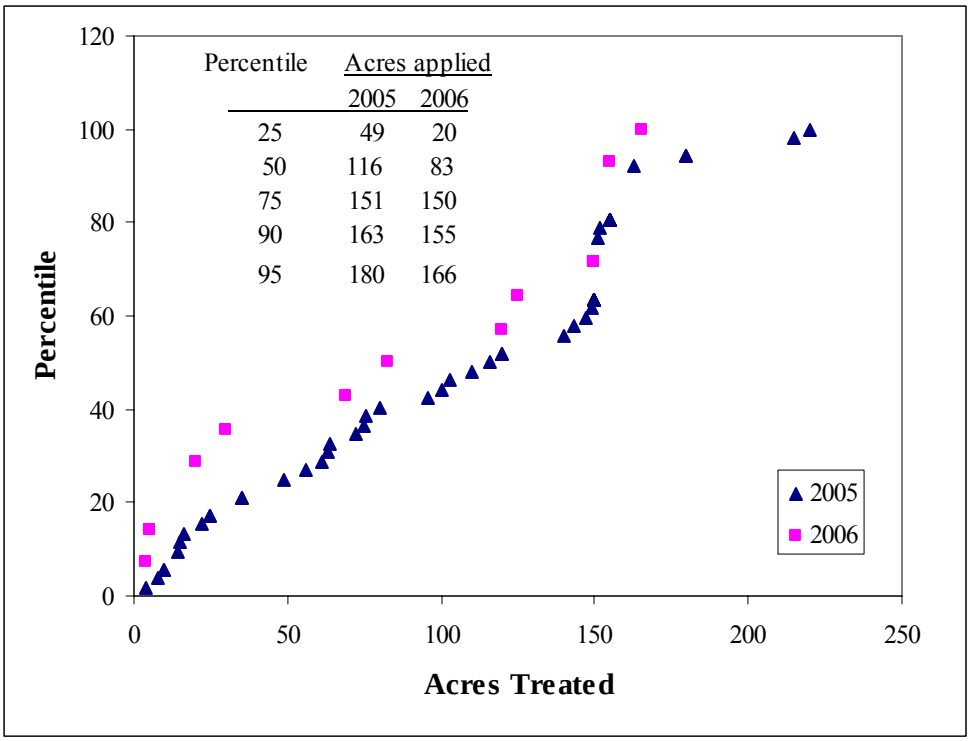
Table 6. Dicofol Use on Cotton in the Top Four Counties (2005-2006)

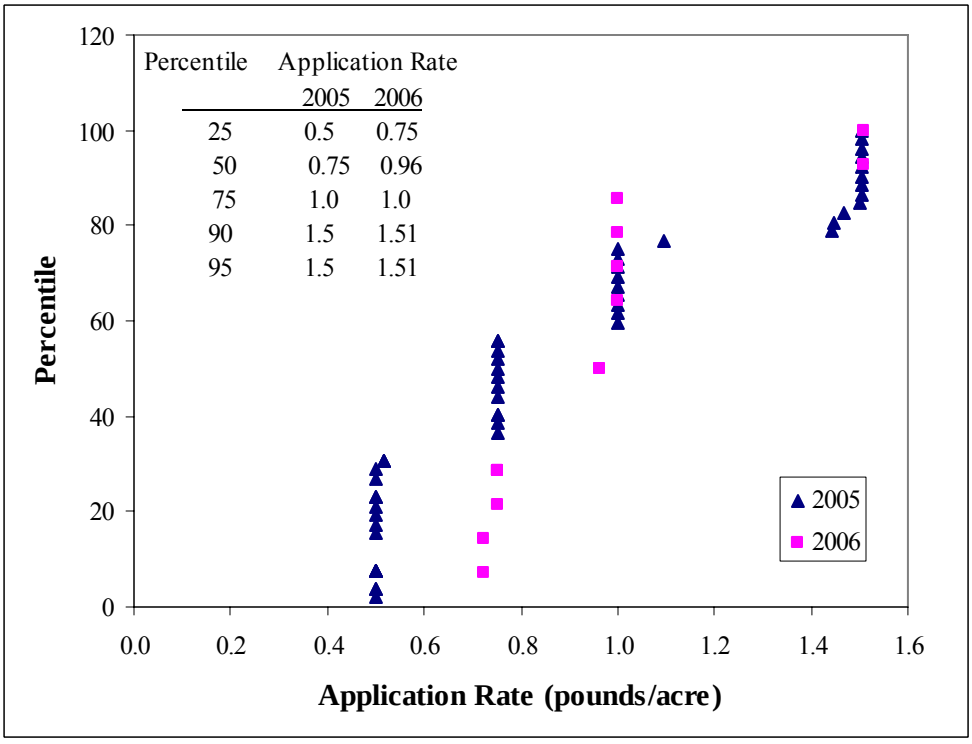
County/Year	Pounds used			Acres treated		
	2005	2006	06/05 (%)	2005	2006	06/05 (%)
FRESNO	57107	25349	44	43436	18743	43
TULARE	20086	6893	34	17681	6937	39
KINGS	28914	7698	27	25542	6851	27
MERCED	16781	19203	114	15334	15210	99

Table 7. Aerial dicofol applications on cotton at application rate of 1.0 pound/acre or higher in the top four use counties during 2005-2006

County	Year	Month	Township range/section	Treated Acres	Applied Pounds	Application Rate
Fresno	2005	AUG	M15S15E01	35	52.6	1.5
Merced	2005	JUN	M08S12E02	49	73.7	1.5
Merced	2005	JUN	M08S12E02	16	24.1	1.5
Merced	2005	JUN	M08S12E02	14	21.0	1.5
Merced	2006	JUL	M09S12E25	165.5	249.7	1.5
Merced	2006	JUL	M09S13E30	20	30.2	1.5
Merced	2005	AUG	M10S11E13	15	22.6	1.5
Merced	2005	AUG	M11S10E01	10	15.0	1.5
Merced	2005	AUG	M11S10E01	8	12.0	1.5
Merced	2005	AUG	M11S10E03	4	6.0	1.5
Merced	2005	JUL	M11S12E10	10	15.0	1.5
Tulare	2005	JUN	M17S24E31	76	111.1	1.5
Fresno	2005	AUG	M13S14E23	103	149.1	1.4
Tulare	2005	JUN	M17S24E31	63	91.0	1.4
Fresno	2005	JUL	M11S13E28	64	70.2	1.1
Fresno	2005	JUN	M14S16E16	110	110.3	1.0
Fresno	2006	JUN	M14S16E20	120	120.3	1.0
Fresno	2006	JUN	M14S16E20	83	83.2	1.0
Fresno	2005	JUL	M14S17E21	80	80.2	1.0
Fresno	2005	JUL	M18S17E30	116	116.3	1.0
Fresno	2006	JUN	M19S17E09	69	69.2	1.0
Kings	2005	JUL	M19S19E19	215	215.5	1.0
Kings	2005	JUL	M21S19E20	155	155.4	1.0
Kings	2005	JUL	M21S19E20	149	149.3	1.0
Merced	2006	JUL	M08S09E09	5	4.8	1.0

Figure 3. Estimated cumulative percentile distribution for the treated acreage and application rate of individual dicofol aerial application on cotton in the top four use counties during 2005 vs 2006





Ambient monitoring study

As part of the Cal/EPA Environmental Justice Action Plan, DPR recommends ambient air monitoring of dicofol in rural communities to address the environmental risk factors that impact children's health. Because dicofol is primarily used on agricultural fields, California rural communities may have higher concentrations of dicofol in ambient air compared to urban communities. The selection of communities is based on objective data, using criteria that can be quantified, validated, and verified, providing a more transparent and fair selection process. DPR selected 32 communities in five counties for evaluation based on their proximity to dicofol applications - Fresno, Tulare, Kings, Merced, and Madera. The communities are identified by name in the 2000 U.S. Census, and are also included in a spatial dataset distributed by the U.S. Census Bureau for use in a Geographic Information System (GIS).

Each of the 32 communities was rated on the following two major categories and eight subcategories:

- Environmental justice factors
  - Population density of children under age 18
  - Median family income
  - Hispanic population percentage
  - Non-white population percentage
- Pesticide use factors
  - Regional (within 5 miles outside community boundary) dicofol use density in 2005
  - Regional (within 5 miles outside community boundary) dicofol use density in 2006
  - Local (within 1 mile outside community boundary) dicofol use density in 2005
  - Local (within 1 mile outside community boundary) dicofol use density in 2006

For the environmental justice factors, the subcategory ratings for Hispanic population and non-white population were based on percentage of total population in each community; but for children under age 18, it was based on density per square mile to minimize the effect of the community size in the ratings. These data plus total population and area of each community used in calculations are from the Census 2000 Demographic Profile Highlights (U.S. Census Bureau, 2000) and were delineated in the spatial dataset used in this study. For the pesticide use factors, regional and local uses were calculated as pounds of active ingredient of dicofol applied in 2005 and 2006 within 1 mile and 5 miles of each community boundary, respectively, using a buffering algorithm in GIS. In calculation of dicofol use density (pounds/square mile) for each community, the use amount within 1 mile or 5 miles was divided by the community area plus 1 mile or 5 miles ring areas around each community. This calculation assumed that the shape of the community is round and no dicofol was applied within the community.

Communities were first rated in each subcategory into four groups according to their ascending ranks, except for the median family income which was ranked in descending order. In most cases, the first 8 communities with the highest ranks were rated four, the second 8 communities were rated three, and so forth. The communities were then placed into four groups according to their ascending ranks in each of the two major categories (environmental justice and pesticide use). The rank in each major category is determined by combining the ratings of the four subcategories. Finally, the two major category ratings were combined, ranked, and rated into

four groups according to their ascending ranks as an overall community rating (Table 8). This system gives equal weight to both major categories.

The individual rank of dicofol use density (pounds/acre) for each community is also included in Table 8 as a reference for ARB monitoring site selection. The difference between the individual ranking and the use rating is that the actual ranks of the four subcategories for each community were combined rather than placing them into four rating groups first. The combined (sum of the four subcategory) ranks were then ranked in ascending order. Therefore this ranking provides a more accurate comparison for dicofol use density around the communities.

DPR recommends ARB select at least five air monitoring sites close to communities where there is high use of dicofol and where the environmental justice factors are the highest. DPR suggests that consideration should go to sites in the communities of Mendota, Cantua Creek, Firebaugh, Huron, and San Joaquin in Fresno County; Woodlake, Ivanhoe, Tipton, and London in Tulare County; Planada in Merced County; and Kettleman City in Kings County. An additional monitoring site distant to dicofol applications should be selected for urban background samples. The sites should be located in relatively high-population areas or in areas frequented by people (e.g., schools, fire stations, or other public buildings).

Based on dicofol use pattern changes in 2005 and 2006, the dicofol uses in top four counties, during June 2005, July 2005, June 2006, and July 2006 are mapped on Figure 4-7, respectively. The 32 communities are delineated on these maps for convenient references for monitoring site selection. The ambient air monitoring should be conducted over an 8-week period during dicofol peak use in June and July (Figure 2 and Table 4). At each sampling site, four 24-hour samples should be collected per week during the sampling period.

In addition to the ambient monitoring samples, a particulate sample, with a filter disk in front of the sorption tube to monitor particulates, should be collected at one sampling location during each sampling period. Four collocated samples should be collected in four random dates at each sampling location. Field spikes should be sampled at the same environmental conditions (e.g. temperature, humidity, wind) and monitoring study conditions (e.g. air flow rates, exposure to sunlight) as those during ambient sampling. Field and trip blanks and field spikes should be collected periodically throughout the monitoring study. DPR requests that the ambient monitoring report should include:

1) the proximity, including the distance and direction, of the sampler to treated or potentially treated fields;
2) the distance of each sampler located above the ground;
3) the information relevant to the monitoring study (e.g. trees, buildings, particular industrial or commercial facilities and activities) for the sampler surrounding areas; and
4) latitude and longitude coordinates for sampling sites with a description of which Datum was used (i.e. NAD 27 or NAD 83).

Table 8. Rating for each community

Community	County	Environmental Justice Factors Rating	Dicofol Use		Total Rating
			Rank	Rating	
Mendota	Fresno	4	31	4	4
Cantua Creek	Fresno	3	27	4	4
Firebaugh	Fresno	3	32	4	4
Woodlake	Tulare	3	23	4	4
Planada	Merced	4	17	3	4
Ivanhoe	Tulare	3	16	3	3
Tipton	Tulare	3	21	3	3
Huron	Fresno	4	10	2	3
Kettleman City	Kings	4	11	2	3
London	Tulare	4	8	2	3
San Joaquin	Fresno	4	9	2	3
Gustine	Merced	1	28	4	2
Lemoore Station	Kings	1	30	4	2
Tulare	Tulare	1	29	4	2
Visalia	Tulare	1	26	4	2
Corcoran	Kings	2	23	3	2
Los Banos	Merced	2	22	3	2
Riverdale	Fresno	2	20	3	2
Pixley	Tulare	3	14	2	2
South Dos Palos	Merced	3	15	2	2
Terra Bella	Tulare	3	13	2	2
Dos Palos	Merced	1	25	3	1
Hanford	Kings	1	18	3	1
Tranquillity	Fresno	1	18	3	1
Armona	Kings	1	12	2	1
Kerman	Fresno	3	6	1	1
Stratford	Kings	3	4	1	1
Laton	Fresno	2	4	1	1
Merced	Merced	2	7	1	1
Raisin City	Fresno	2	2	1	1
Caruthers	Fresno	1	3	1	1
Chowchilla	Merced	1	1	1	1

Figure 4. Dicofol use in June 2005 in the top four counties and proposed communities

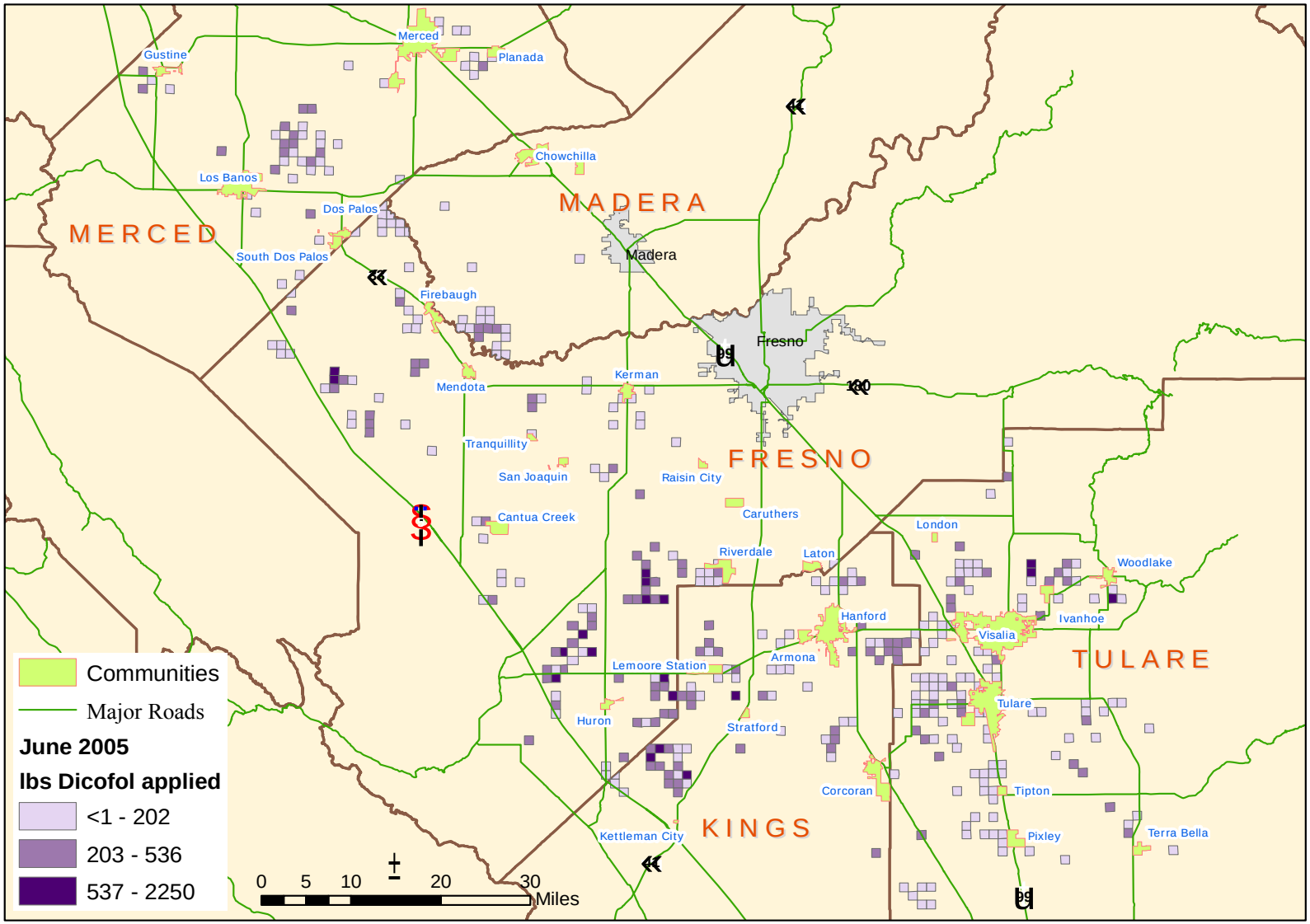


Figure 5. Dicofol use in July 2005 in the top four counties and proposed communities

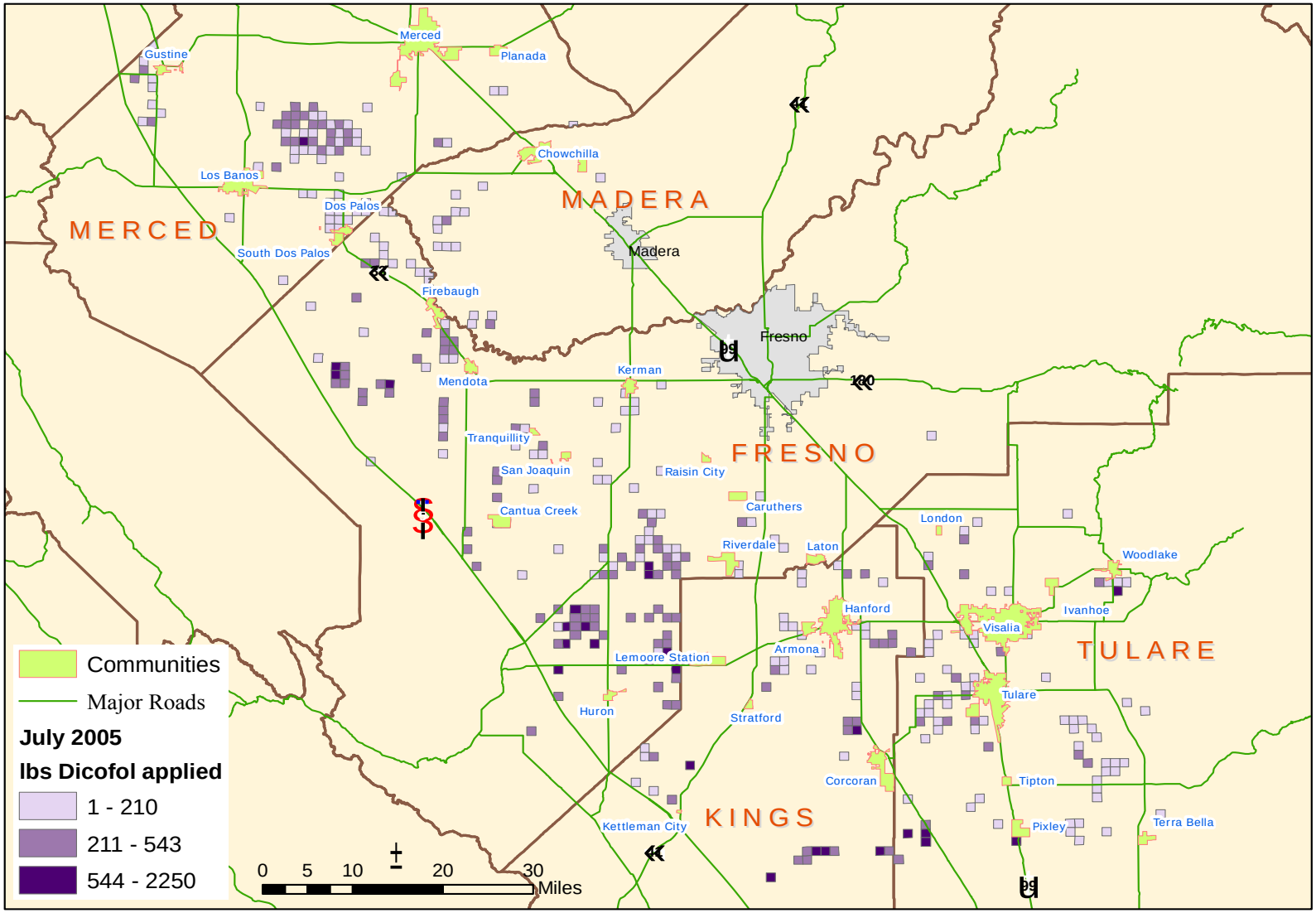


Figure 6. Dicofol use in June 2006 in the top four counties and proposed communities

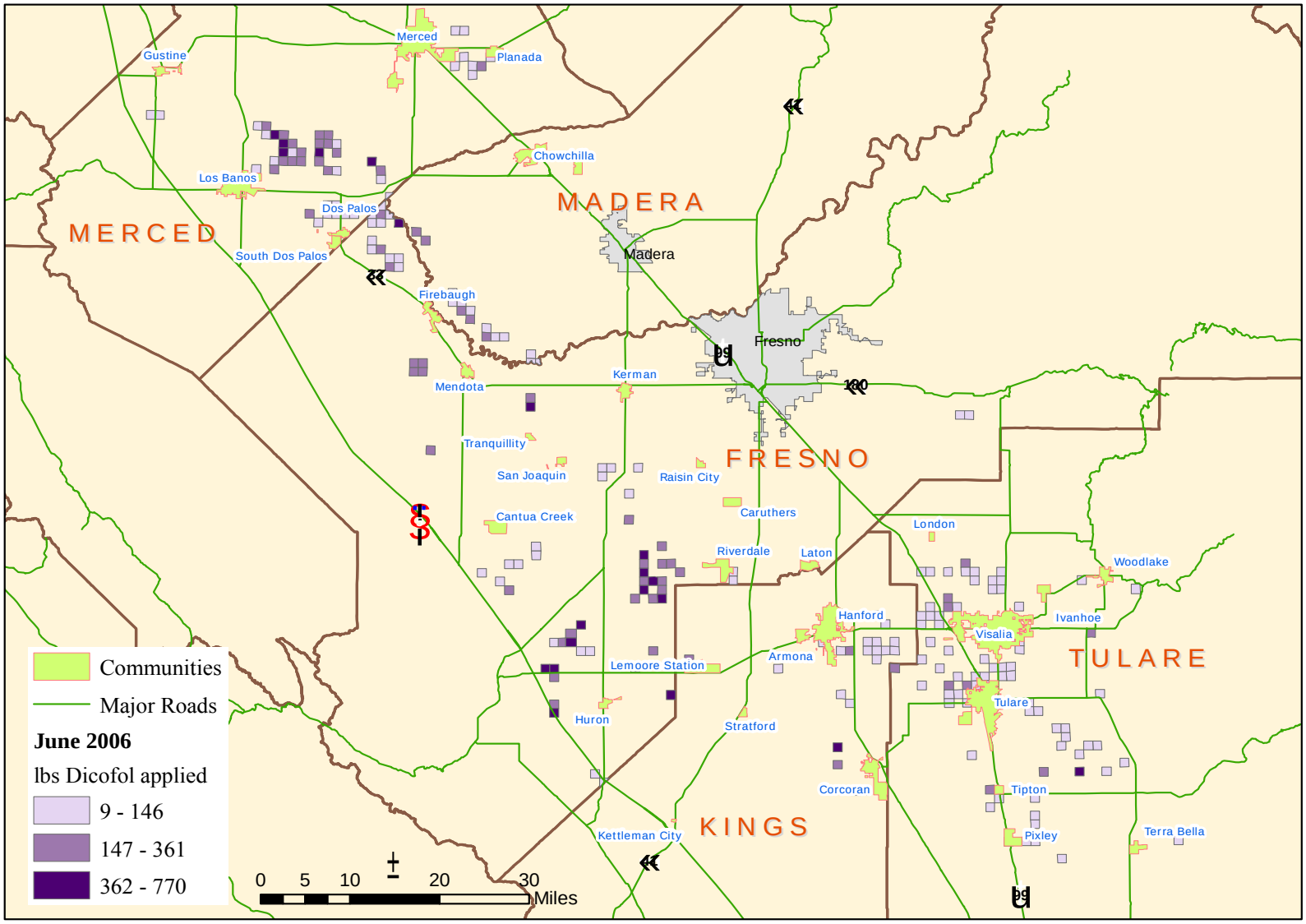
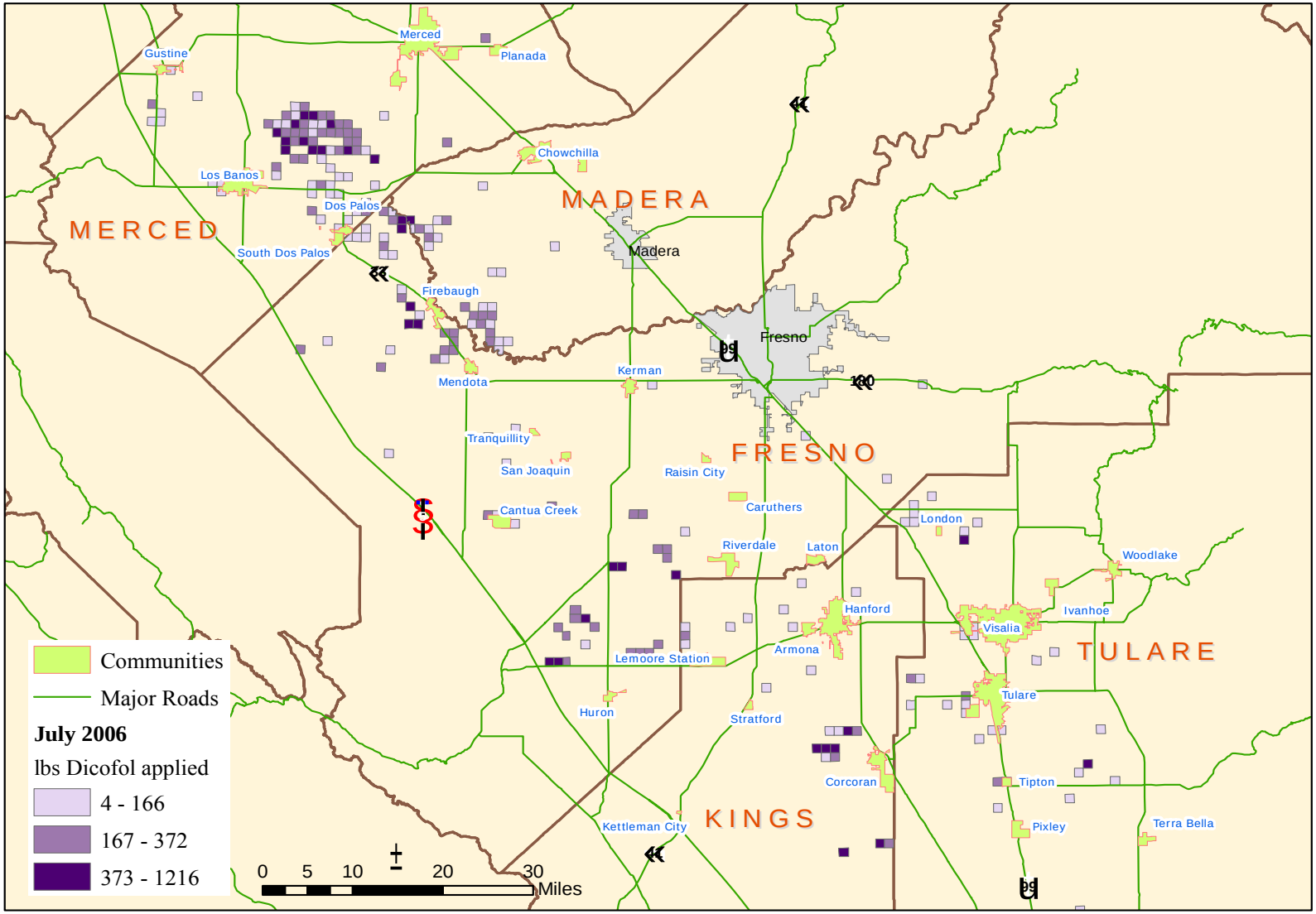


Figure 7. Dicofol use in July 2006 in the top four counties and proposed communities



D. SAFETY RECOMMENDATIONS

The following precautions are stated on the product labels and material safety data sheets. Most statements pertain to applicators. Therefore, these precautions are reference for monitoring staff.

Product labels for the dicofol carry a Danger/Caution warning. Dicofol may burn on fire and containers may explode in the heat of fire to produce toxic products of hydrogen chloride and chlorine gas. Keep away from fire and sparks. It is poisonous by inhalation, skin contact, or swallowing. Do not breathe or contact dicofol. Inhalation or contact of dust or solvent formulations will irritate to eyes, nose, throat, lungs, and skin. Overexposure by any rout to chlorinated pesticides may cause nervousness and hyperactivity, headache, nausea, vomiting, unusual sensations and fatigue.

Personal protection equipment includes coveralls over long-sleeved shirt and long pants, chemical resistant apron or other impervious clothing, goggles, gloves, footwear plus socks, headgear if overhead exposure, etc.

E. REFERENCES

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